

WHAT IS CLAIMED IS

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1. A magnetic recording medium
comprising:

at least one exchange layer structure; and
a magnetic layer formed on said exchange layer
10 structure,

said exchange layer structure comprising a
ferromagnetic layer, and a non-magnetic coupling
layer provided on said ferromagnetic layer and under
said magnetic layer,

15 said ferromagnetic layer and said magnetic
layer having antiparallel magnetizations,

said non-magnetic coupling layer being made of
a Ru-M3 alloy, where M3 is an added element or alloy,
and a lattice mismatch between said non-magnetic
20 coupling layer and said magnetic layer and said
ferromagnetic layer respectively disposed above and
below said non-magnetic coupling layer is adjusted
to approximately 6% or less by addition of M3.

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2. The magnetic recording medium as
claimed in claim 1, wherein said non-magnetic
30 coupling layer has a thickness in a range of 0.4 to
1.0 nm.

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3. The magnetic recording medium as
claimed in claim 1, wherein said ferromagnetic layer

is made of a material selected from a group of Co, Ni, Fe, Ni-based alloys, Fe-based alloys, and Co-based alloys including CoCrTa, CoCrPt and CoCrPt-M2, where M2 = B, Mo, Nb, Ta, W, Cu or alloys thereof.

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4. The magnetic recording medium as
10 claimed in claim 1, wherein said magnetic layer is made of a material selected from a group of Co, and Co-based alloys including CoCrTa, CoCrPt and CoCrPt-M4, where M4 = B, Mo, Nb, Ta, W, Cu or alloys thereof.

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5. A magnetic recording medium
20 comprising:
at least one exchange layer structure; and
a magnetic layer formed on said exchange layer structure,
said exchange layer structure comprising a
25 ferromagnetic layer, and a non-magnetic coupling layer provided on said ferromagnetic layer and under said magnetic layer,
said ferromagnetic layer and said magnetic layer having antiparallel magnetizations,
30 said non-magnetic coupling layer being made of a Ru-M3 alloy, where M3 = Co, Cr, Fe, Ni, Mn or alloys thereof.

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6. The magnetic recording medium as

Claimed
claimed in claim 5, wherein an amount of the element M3 added to Ru is 50 at% or less for Co, 50 at% or less for Cr, 60 at% or less for Fe, 10 at% or less for Ni, and 50 at% or less for Mn.

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7. The magnetic recording medium as
10 claimed in claim 5, wherein said non-magnetic coupling layer has a thickness in a range of 0.4 to 1.0 nm.

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Sub
8. The magnetic recording medium as
claimed in claim 5, wherein said ferromagnetic layer
is made of a material selected from a group of Co,
20 Ni, Fe, Ni-based alloys, Fe-based alloys, and Co-
based alloys including CoCrTa, CoCrPt and CoCrPt-M2,
where M2 = B, Mo, Nb, Ta, W, Cu or alloys thereof.

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9. The magnetic recording medium as
claimed in claim 5, wherein said magnetic layer is
made of a material selected from a group of Co, and
30 Co-based alloys including CoCrTa, CoCrPt and CoCrPt-
M4, where M4 = B, Mo, Nb, Ta, W, Cu or alloys
thereof.

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Sub C1
10. A magnetic storage apparatus

comprising:

at least one magnetic recording medium comprising at least one exchange layer structure, and a magnetic layer formed on said exchange layer structure,

said exchange layer structure comprising a ferromagnetic layer, and a non-magnetic coupling layer provided on said ferromagnetic layer and under said magnetic layer,

said ferromagnetic layer and said magnetic layer having antiparallel magnetizations,

said non-magnetic coupling layer being made of a Ru-M3 alloy, where M3 is an added element or alloy, and a lattice mismatch between said non-magnetic coupling layer and said magnetic layer and said ferromagnetic layer respectively disposed above and below said non-magnetic coupling layer is adjusted to approximately 6% or less by addition of M3.

11. A magnetic storage apparatus comprising:

at least one magnetic recording medium comprising at least one exchange layer structure, and a magnetic layer formed on said exchange layer structure,

said exchange layer structure comprising a ferromagnetic layer, and a non-magnetic coupling layer provided on said ferromagnetic layer and under said magnetic layer,

said ferromagnetic layer and said magnetic layer having antiparallel magnetizations,

said non-magnetic coupling layer being made of a Ru-M3 alloy, where M3 = Co, Cr, Fe, Ni, Mn or alloys thereof.